THE ORGANISATION OF A STERILITY SERVICE WITHIN A FAMILY PLANNING ASSOCIATION CLINIC

By MARGARET HADLEY JACKSON, M.B., B.S., D.R.C.O.G.

It is interesting to look back twenty years or so and recall what a small place the problems of human fertility took in the medical curriculum; the word "sterile" in those days conjured up visions of autoclaves, boiling instruments, white gowns, rubber gloves, and culture plates which grew no bugs; such things as blocked fallopian tubes and azoospermia, Dutch caps, and spermicides were never mentioned to the student. Nowadays they are commonplaces, and the general public has become passionately interested both in its hypo- and hyper-fecundity, and has dragged a rather unwilling medical profession along with it.

Much of the pioneer work in this field was done in America and on the Continent. In our organisation of facilities for the investigation and treatment of sterility we are still far behind America; there they have lavishly equipped centres where husband and wife can, if necessary, live in and be investigated from every angle by a team of experts. Until quite recently very few, even of our teaching hospitals, had a department where a sterile couple could be dealt with as a unit, and where semen analysis and post-coital tests could be done adequately. Away from big centres difficulties were even more acute and believing that a clinic, where hyperfertile couples sought advice to control their fertility, was a right and proper place to give help to the barren, and faced with a growing demand for this help from patients, we have done what we could to meet it by establishing a Sterility Service in connection with a Family Planning Association clinic. The work increased slowly at first, but in the last three years there has been a much steeper rise in the number of cases attending for advice on sterility than in the number attending for contraception. (See Table I.)

TABLE I.

	Total number of patients seeking advice	For Contraception	%	Because of Sterility	%
1933	146	145	99.3	1	0.7
1934	172	170	98.9	2	1.1
1935	181	180	99.5	1	0.5
1936	186	180	96.8	6	3.2
1937	175	165	94.3	10	5.7
1938	189	175	92.6	14	7.4
1939	198	180	90.9	18	9.1
1940	220	200	90.9	20	9.1
1941	355	315	88.8	40	11.2
1942	413	350	84.8	63	15.2
1943	486	325	66.9	161	33.1

A great deal of the business of unravelling the causes of barrenness is dependent on laboratory findings, and any clinic or outpatient department attempting this work must have the co-operation of a pathologist, or at any rate of someone skilled in laboratory technique and used to handling biological material. We are fortunate in having, not only the co-operation of the long-suffering pathologist at the local hospital who does the pregnancy diagnosis tests for the clinic, but also the voluntary services of one biologist who has acquired special training and skill in carrying out seminal analysis and other procedures, and of another who sections the endometrial biopsies. Without their help, and indeed their labours, it would not have been possible to establish this service. Unfortunately at a clinic of this sort it is virtually impossible in war time to arrange for testicular biopsies and for endocrine estimations, and these we have had to dispense with. In addition to the above helpers we have a voluntary staff of secretaries and two nurses, and the unstinted advice and co-operation of the honorary staff at the hospital. The clinic is housed in a Dispensary, and has the use of one big consulting room, a small operating room, a waiting-room, and a room in which the secretarial staff works; the laboratory is across

the road in the University. Here, then, is the framework on which has been built this sterility service at a Family Planning Association clinic. It is perhaps worth emphasising that the combination of a contraceptive with a sterility service offers unique opportunities for controlled observations.

I give below an outline of the procedures we have found workable (and which may be helpful to others) for cases needing full investigation. We are only able to interview the wives, but a complete seminal examination and frequent post-coital tests provide most important information about the husband's fertility or otherwise. If it seems that a husband needs further examination he is referred through his wife to the appropriate doctor or hospital.

Most of the cases have been dealt with at the Exeter, Barnstaple and Totnes Family Planning Association clinics; some have been seen as private patients. All have been handled as outpatients, thus there has been no blocking of hospital or nursing home beds, and only the minimum loss of working time to patients—all important considerations more particularly in war time. It is worth stressing that all the essential investigations and much of the treatment likely to be needed can be done with perfect safety without putting the patient to bed, and without an anaesthetic of any sort. The cervix is insensitive to heat, merely registering the application of a cautery as a mild dysmenorrhoea. Provided the presence of active pelvic inflammatory conditions have been excluded, a small uterine sound, an insufflation cannula, and a Sharman curette can with gentleness, asepsis and care be passed safely through the internal os, often without the patient feeling anything, and at the worst causing a period pain lasting a few moments. This is more than offset by having the patient's conscious co-operation and comments during an insufflation or salpingogram, and by the avoidance of anaesthetic risk and loss of time and money.

Complete and absolute sterility in either men or women is comparatively rare, but minor degrees of subfertility are relatively common; there is in fact a steady gradation down the scale from extreme hyperfertility to complete sterility with the curve piled high in the middle regions. The question may be asked at what point should a marriage be labelled sterile; when is it sensible for a couple to ask advice and justifiable for the doctor to intervene? Obviously there is no universal answer, but as a very general rule if a couple have lived together and remained barren for twelve months without using any form of birth control they will be well advised to seek help; such things as dyspareunia, impotence, and early miscarriage may well call for intervention sooner. All cases do not need full investigation right away; this becomes apparent after taking a history and doing a pelvic and perhaps a post-coital examination. Some quite simple advice and treatment, such as advice about fertile days, frequency of coitus, relaxation, cleaning up an unhealthy cervix, and so forth, may be all that is needed. If, however, no pregnancy appears in a few more months it is as well to carry out a further investigation. In doing this, it is not always possible or desirable to do things in the same order: the husband's leaves and feelings, and the wife's menstrual cycle have to be taken into consideration, but in an obstinate case it is essential that both husband and wife should submit to thorough investigation, and that the couple should be dealt with as a unit if any degree of success is to be attained. The examination must be planned so as to obtain as far as possible answers to the following points:—

1. Are there any endocrine defects in either husband or wife?
2. Are there any toxic factors at work to depress gonadal functions?
3. Are there any faults or difficulties in delivery or reception of the semen?
4. Are there sufficient normal sperm being produced, and is their motility and viability adequate?
5. Do the husband's sperm survive well in his wife's cervical mucus? and are they likely to reach the ovum?
6. Is there any obstruction, complete or partial, in either genital tract?
7. Is ovulation occurring, and at what point in the menstrual cycle?
8. Are conditions favourable for embedding?
9. Are any genetic lethal factors operative?

Examination of wife.

1. Medical history, including detailed menstrual and marital history (evidence of impotence on the part of the husband will come out in this).
2. Ask the patient to keep a careful record of menstrual periods, dates of coitus or hus-

band's leaves, and, if considered reliable enough, ask her to keep a record of morning and evening temperatures.

3. General examination, including B.P. and pulse rate, measurement of height and span, fat and hair distribution, etc.
4. Bimanual pelvic examination.
5. Examination of vaginal fluid (wet film, stained film, and pH).
6. Examination of cervix (a) for evidence of infection and pH; (b) post-coital (Huhner's) test; coitus having taken place within 2 to 60 hours of visit, to establish presence and viability of sperm. A number of such tests should be made, choosing different days in the cycle and various intervals of time between intercourse and examination: much valuable information will thus be obtained. The writer does not yet feel prepared to be dogmatic about the most useful interval of time after coitus to choose for doing the test, but it is essential to obtain plenty of mucus (which is by no means always easy), and it is good practice when time permits to take separate samples from the upper and lower cervical canal.
7. Passage of uterine sound to establish uterine measurements and position.
8. Endometrial biopsy more particularly in the pre-menstrual phase.
9. Tubal insufflation (Rubin's test) repeated several times if necessary.
10. Uterosalpingography, by arrangement with local radiologist.
11. Endocrine estimations are generally out of the question, though it may be possible to arrange for estimation of Pregnanediol in twenty-four hour samples of urine. B.M.R. estimations are difficult to arrange, and opinions are divided as to their usefulness in minor degrees of thyroid imbalance.

Examination of husband.

1. It may be possible to arrange a special session for men; if not, an examination by his own doctor should be asked for, and, if indicated, more detailed examinations by urologist, pathologist, and radiologist.
2. A complete seminal examination must be made, including, if possible: volume, number of sperm per c.c., degree and percentage of motility and viability pH, buffering power, differential count of stained film to establish percentage and types of abnormal sperm and number of pus cells per c.c. Careful instructions as to how the semen should be collected for this examination should be given as follows:—
 - (a) There should be no connection for 2 or 3 days before it is collected; state date of last connection on the slip.
 - (b) The specimen must be collected direct into a glass tube which should first be warmed to blood heat; care should be taken to catch the whole specimen if possible. A sheath must not be used.
 - (c) Cork the tube firmly, put it into the box provided, write the name and address and the time and date when the specimen was produced on the label, and see that it is delivered to the laboratory within a few hours (1 to 6) of production. It should be kept as cool as possible (cold room temperature), once it has been caught in the tube, until it reaches the laboratory.

A perfectly clean dry tube, one inch at least in diameter, with a well-fitting waxed cork should be provided for the collection of seminal fluid.

For both when indicated:

Examination of urine and of blood for W.R., G.C.F.T. and Rhesus factor, and other blood groups.

List of Equipment Needed

A good head lamp or some other form of illumination.
 Bivalve speculum with long blades.
 A small volsellum with fine teeth.
 Long forceps.
 Wool-holding cervical probes.
 Smallest sized Hegar Dilators.
 Uterine sound.

Suction cannula with stiff rubber bulb for collecting cervical mucus; (Bonney's intra-uterine catheter with two lateral holes near the tip does well).

Sharman's biopsy curette.

Rubin's, Gordon King's, or Bonnet's insufflation apparatus.

2 cc. syringe with a bayonet fitting; fine curved intra-uterine cannula for inseminations.

10 or 20 cc. syringe with a bayonet fitting; intra-uterine cannula with an acorn adjustable if possible) for inserting opaque oil.

Small electric cautery and battery.

Microscope, lamp and slides.

Fixatives for endometrial biopsies and cervical mucus slides.

Bakelite spoons for collecting vaginal fluid.

Platinum loop for making smears for bacteriological examinations, etc.

THERAPEUTIC MEASURES

Wife.

- (1) General advice on eradication of septic foci; on diet, vitamins, rest, exercise, period of maximum fertility and timing of husband's leave to fit in with this—a certificate will often get him home on the right dates, frequency of coitus, position during coitus, etc.
- (2) Stretching a tough hymen if present, and correction of vaginismus by persuasion.
- (3) Treatment of trichomonas vaginalis and other vaginal infections if present; and of cervical infection and erosion by cautery and painting; and sometimes with local application of sulphonilamides.
- (4) Correction of uterine displacements if present, and if possible.
- (5) The slight dilation of the cervical canal and gentle "traumatising" of the endometrium effected when doing a biopsy undoubtedly have a stimulating effect on the endometrium, similar to the deciduoma-formation experimentally produced in animals.
- (6) Tubal insufflation and injection of opaque oil have a therapeutic as well as a diagnostic value.
- (7) Endocrine treatment; complicated and individual and speculative (see below).
- (8) Control of habitual abortion by Vitamin E, Thyroid and luteinising agents or Progesterone, rest and sedatives.
- (9) Surgical procedures; D. and C., myomectomy, removal of ovarian cysts, salpingotomy, etc., involving reference to a competent surgeon.

Husband (with the co-operation of his own doctor, or M.O.).

- (1) Advice on diet, exercise, rest, eradication of septic foci, etc. Psychological treatment for some forms of impotence.
- (2) Endocrine (both for impotence and abnormal spermatogenesis).
- (3) Short periods of treatment with sulphonilamides in cases where there is evidence of local (testicular or prostatic) infection.
- (4) Artificial insemination, either with the husband's semen or with semen from a donor, is only needed in a small proportion of cases where the male is proved to be absolutely and irremediably impotent or sterile, or hopelessly subfertile. In cases where the husband is absolutely sterile semen may be obtained from donors of proved fertility and sound health and heredity; the complete and willing consent of the husband must be obtained first, and it is best to have this in writing. It may also be the solution for those cases where the partners are rhesus incompatible, and when successive pregnancies are marked by a crescendo of foetal disasters.

A few special words are needed about the treatment of sterility by endocrines. That preparations produced by reputable firms are potent, and indeed dangerous in unskilled hands, is beyond question; but this type of therapy is still in the experimental stage, and considerable differences of opinion still exist not only as to the therapeutic value, but also as to which particular preparation is best for any given condition and in what dosages. Thanks to the generosity of Organon Ltd. and Parke Davis and Co. we have had abundant supplies of endocrine preparations for clinic patients, and some brief mention of the writer's experience with these in the treatment of subfertile patients may possibly be of interest.

The following remarks are made dogmatically with the full realisation that others may not agree with them.

Oestrogens, whether they be the natural or synthetic type, must be given intermittently—if possible in harmony with the normal phases of the menstrual cycle. There is considerable variation in individual response and dosage should be varied accordingly. The vaginal smear and pH afford a valuable measure of the adequacy of the dose in any particular case. Treatment with oestrogens is probably best overlapped or followed by treatment with progesterone. This type of therapy has been found of value in genital hypoplasia, also in certain cases of blocked or spastic tubes, and for reducing cervical blockade. Oestrogens given locally in the form of suppositories are also of value; and given in a single massive dose (50,000 to 100,000 units) by injection on about the 10th to 12th day of the cycle they seem to have the special effect, in some cases, of inducing ovulation. Seral gonadotrophins given intravenously are also reputed to have this effect, but the writer has not had much success with these.

Some form of luteinising agent (progesterone or APL hormone from pregnancy urine or seral gonadotrophin) has been used with success for encouraging embedding and for staving off threatened abortion; but adequate doses must be employed.

Thyroid for hypothyroidism both in the male and female is of great value, and should be given intermittently.

Methyl testosterone is useful given orally (absorbed from the sublingual space) in doses of 10 to 20 mgm. daily for 4 days, just before the wife's fertile period to increase the sexual drive in men with minor degrees of impotence. The treatment of inadequate spermatogenesis is uncertain; check-up on the results of treatment by repeated seminal analysis is important, though the evidence obtained from this not infrequently conflicts with clinical results. For the proper diagnosis of this condition and control of treatment testicular biopsy or puncture would seem to be desirable; unfortunately we have only been able to make arrangements for this to be done in one case. Testosterone propionate, seral gonadotrophins, Ambion A (when it can be obtained), and Synapoidin have all been used with success, i.e. the wives have conceived within a short time of the husband having had treatment with one or other of these preparations.

SUMMARY OF FINDINGS AND RESULTS

In all, 336 cases have been seen. Some only needed simple advice and treatment; some needing fuller investigation were dismayed at the prospect and went away; some decided to adopt. More than 230 have been investigated more or less completely.

Taking the group as a whole (336 cases) the following points are worthy of note:—

Average age { Husband = 32.7 years
 { Wife = 30.3 years
Average number of years married = 5 years 2 months

Up to the date of their first attendance of these 336 women:—

238 had had no pregnancies;

58 had had either miscarriages only, still births, ectopic pregnancies, or various combinations of these;

40 had had at least one live birth, some of these had had miscarriages as well.

In considering efforts at contraception before the first visit, it is of interest to compare this group with a fertile group of 300 consecutive cases attending the clinic for contraceptive advice:—

	No contraceptives, or only for less than 3 months	Used for 3 months or longer		Insufficient Data.
		C.I. only.	Sh. Cap and/or chemical	
336 patients attending for advice on sterility	87 (26 %)	92 (27 %)	125 (37 %)	32 (10 %)
300 patients attending for advice on contraception	27 (9 %)	115 (38 %)	141 (47 %)	17 (6 %)

This does not suggest that the use of contraceptives induces sterility, but rather that the hyper-fertile woman makes somewhat fruitless efforts to control her fertility by using birth control of one sort or another.

No attempt can be made here to give a detailed description of the methods employed in investigating these sterile matings, nor of the findings in each case or the groups into which they fall; a few somewhat scattered observations are presented which it is hoped may be of interest. Reviewing the histories given by these 336 infertile women and of their general examinations no points stand out as occurring with significant frequency—gross aberrations of the menstrual cycle are uncommon—their periods are no more irregular than those of fertile women, nor is the age of onset obviously different; only one case of primary amenorrhoea is present in the series and secondary amenorrhoea of more than six months' standing, excluding that associated with lactation, occurs less than half a dozen times. Heavy periods, mid-menstrual spotting, and the short cycle are rather more frequent, as also is dysmenorrhoea.

Thin purulent or thick cheesy, often irritating, vaginal discharges (as opposed to the mucopurulent discharge so common in multiparae) occur rather frequently among these infertile women more particularly in those with other evidence of endocrine imbalance. Dyspareunia is a presenting symptom in about 35 per cent of the cases; frigidity is common (but then so it is in fertile women though quite possibly in many of them it has a different origin). A history of impotence (complete or relative) crops up in less than 5 per cent of the cases. My impression is that the normal rhythm of sexual intercourse is rather less frequent in the subfertile than in the fertile even when the former urgently desire, and the latter are terrified, of having another child. Minor degrees of genital hypoplasia and hypothyroidism are not uncommon in both sexes; major degrees have not often been seen. Diabetes and acromegaly have each been met with once or twice. It has been found difficult to get an accurate history about the incidence of mumps. The scar of an appendicectomy is a frequent finding.

Coming now to the special investigations:—

Examination of vaginal fluid.

More than 400 samples of this have been examined. The fluid is collected in a small bakelite spoon. A loopful in a little saline is examined microscopically on the spot; the rest is taken to the laboratory for electrical estimation of pH and the making of two more films, (1) fixed by heat and stained by Gram's method for the examination of the bacterial content, and (2) fixed in osmic vapour and stained with iron haematoxylin and eosin for the examination of the type and percentage of the various cellular elements present. These examinations provide information about the presence of trichomonas vaginalis and monilia, about the predominant bacterial strains, and about some forms of endocrine imbalance. Recently, thanks to the interest of yet a third biologist at the University, we have started attempting to culture trichomonas vaginalis from vaginal fluid from cases which, according to the microscopical examination of a wet film, are no longer or never have been infested with these parasites.

It may be of interest to note that we have found the range of pH values for vaginal fluid to lie between 4.2 and 7.0; more than 90 per cent of all the samples (both from fertile and infertile women) have a pH of less than 6.0. Trichomonas vaginalis have been found to flourish in fluids near the alkaline end of the range, 5.4–6.7; monilia are usually found in fluids nearer the acid end; only once have we found a vagina infested both with trichomonas vaginalis and monilia.

Tubal insufflation.

Gordon King's apparatus, which has been found perfectly satisfactory and easy to handle, has been used since 1939, and well over 200 insufflations have been done; the majority between the 9th and 20th days of the cycle, though later days have been used without any obvious drawbacks.

The following percentages may be taken as representing the results:—

<i>Patent and peristaltic</i>	<i>Stenosed or spastic</i>	<i>Blocked (complete bilateral)</i>
67 %	25 %	8 %

No cause for anxiety has arisen during or subsequent to any of these insufflations. One case with stenosed tubes felt faint and vomited towards the end and immediately after, but had completely recovered after resting for a quarter of an hour; several have complained of a sense of pressure and tightness or constriction in the chest, but these symptoms have passed off in

a few minutes; referred shoulder pain of greater or less degree is universal in cases with patent tubes and without adhesions; commonly it is noticed at once, sometimes not until the patient has been jolted about in a bus or train on her way home. About a dozen have complained of a heavy period following insufflation, and a few of sacral ache for periods ranging from 1 to 20 days. No case with subsequent pyrexia has been reported by the patients' doctors. A number of patients have conceived immediately following an insufflation (within 1 to 3 months) without other treatment of any sort.

Uterosalphingograms.

These are done in the X-ray department of the local hospital by kind permission and courtesy of the radiologist. In order not to trespass too much on his time and that of his staff, and also from motives of economy, only carefully selected cases are submitted to this examination, e.g. those in which a block needs localising, or in which distortion of the tubal or uterine cavity or cervical canal seems likely. Between 30 and 40 have been done without any ill-effects. One patient with bilateral tubal blockage with a small hydrosalpinx on one side complained of considerable pain during and felt faint and sick after. A rest of half an hour was needed before she felt fit to dress and go home. Rather surprisingly she had no troublesome sequelae except sacral ache; she had no pyrexia. One practical point is perhaps worth mentioning; although the majority of insufflations can easily and successfully be carried out without fixing the cervix with a volsellum, this must be done for a salpingogram, otherwise the cervix is pushed far up by the unopposed pressure which it is necessary to exert, and the position of the uterus is completely falsified. No case of intravasation of the pelvic veins with the opaque oil has yet occurred—possibly because the hospital is fortunate in still having stocks of the old thick oil available.

Endometrial biopsies.

In nearly all 500 of these have been taken at all phases of the menstrual cycle in more than 230 women, but many of these have been from fertile patients for control observations; so little does this procedure hurt that many parous patients have no idea a biopsy has been taken until they are told at the end of the examination. A Sharman's curette has been used throughout, and with a little practice very adequate material can be obtained for examination. The position of the fundus is ascertained; the cervical canal is cleared of mucus and painted with gentian violet or iodine; a very small-sized Hegar is used to find the way along the cervical canal and through the internal os; sometimes the canal is surprisingly tortuous or lacunated, and the tip of the Hegar may find its way into one or more blind alleys before reaching its proper goal. No force should be exerted but a gentle levering action against the blades of the speculum may help to get the Hegar through the internal os. Having learnt the way and memorised it, the curette is then with great gentleness passed well up to the fundus and the cutting face pressed firmly against the endometrial surface; pressure being kept up for an inch or so as the curette is withdrawn. It is worth making a note of the macroscopic appearance of the strip of endometrium so obtained, and whether it has been obtained from the anterior or posterior wall. Bouin has been used as the fixative for all routine work, though various other experimental fixatives have been employed. The bottle is immediately labelled with the patient's name and number, the date on which the biopsy was taken, and the date of the last menstrual period; the patient is told to report without fail when the subsequent period starts. These facts are entered in a special register, and the microscopical report on the biopsy is entered alongside. Thus it is easy to see at a glance whether any given section shows development compatible with the stage in the cycle when it was taken. It is impossible to discuss the findings here, but briefly it may be said that it is rare to find an endometrium which shows no sign of progestational change, though in many this appears to be inadequate or incomplete. It would seem that the endometrial biopsy does not provide a complete answer to the question as to whether normal ovulation has occurred, though it does provide important information about ovarian function and about endometrial response. It is not possible from the biopsies in this series to support Sharman's finding of tuberculous endometritis in 5 per cent of the biopsies from sterile women (quoted by Sutherland (1943), *J. Obst. and Gynaec. of Br. Emp.*, 50, 161), but in the light of this paper a further search is being made through the sections which will take some time to complete. It is noteworthy that in about a dozen cases no period has followed the taking of a biopsy in the pre-menstrual phase (i.e. presumably after fertilisation has occurred). Endo-

metrial biopsy not only does not interfere with pregnancy, but apparently encourages decidua formation.

Post-Coital (Sim's or Huhner's) Test

Well over 300 of these tests have been made on more than 200 women, and, as already stated, the cervical mucus has been collected and examined at all stages of the menstrual cycle and at various intervals of time after coitus, and this both in fertile and infertile women. Many methods have been tried for obtaining adequate samples of cervical mucus which, particularly in the later stages of the cycle and in endocrine deficient patients, is extremely tenacious and difficult to extract, resembling chewing gum as much as anything. A suction cannula with one or two lateral holes near the tip has been found the most satisfactory implement and the quickest to use. The mucus is blown out on to a slide and immediately examined microscopically. In a good positive test numerous progressively motile sperm are immediately found. If sperm are present but immotile, the slide is warmed at 37° C. for 5 to 15 minutes and examined again. The results are recorded at once. It may be categorically stated that progressively motile sperm have been found at all stages of the cycle in both fertile and infertile women and at intervals varying from 4 to 114 hours after coitus; sperm which are immotile but show no signs of cytotysis have been found up to ten days after the last coitus. If repeated examinations are made it is rare not to find a few sperm—though not necessarily motile ones—in at least one sample of mucus, even when the husband has a count as low as 5 million. In about a third of the tests thin smears have been made and fixed in osmic vapour and stained so that the cellular content of the mucus and the morphology of the sperm present in the cervical canal may be studied and compared with the morphology of the total sperm population in a specimen of semen from the husband. This study is still in progress, and results will be published later. The pH of rather more than 100 samples of cervical mucus has been determined electrically, the range being 6.4 to just over 8.0, though very few lie below 7.0. It is not possible to predict with any accuracy what the pH will be from the appearance of the mucus; clear watery mucus has been found with pH values at either end of the range, and so has the rubbery tenacious type, but a markedly purulent mucus seldom has a low pH, and the presence of much blood means a pH in the region of the normal pH of blood (7.4 to 7.8). This test provides a useful check on treatment. We have had several cases in which, after the wife or husband or both have received appropriate treatment, repeatedly negative or poor post-coital tests (i.e. no motile sperm or only few sluggishly motile found during the 2 to 15 hours following intercourse) have been replaced by good tests (i.e. numbers of sperm, more than 25 per cent motile, found anything up to forty hours after the last coitus), and this improvement has been followed by conception.

Seminal Analysis.

The report should, if possible, give information on the following points: volume, pH, buffering power, presence or absence of liquefaction, sperm count per c.c., percentage of morphologically abnormal types, percentage active after one hour at 37° C., viability, presence of pus cells and organisms. More than 300 samples have been examined from 218 men. Most of these are the partners of subfertile marriages, but some are the fathers of families, and a few are the husbands of women who have become pregnant several times in spite of regularly using efficient methods of contraception. An effort is always made to obtain a seminal specimen from the husbands of women who have an "unaccountable failure" when using birth control. The method of collection, as described on page 230, is of great importance, also a record of the date of last intercourse, and these points should be drilled into the patient. In these days of husbands coming and going on short leaves we have not found it possible to insist with any success on an interval of more than 2 or 3 days since the last intercourse. It is sometimes possible to arrange for a specimen to be collected on the first day of the husband's leave, but this is often after a period of abstinence of 6 to 12 weeks (with irregular and unrecorded emissions), and our impression is that it is no sounder, if as sound, to judge a specimen after a long period of abstinence than after a recent coitus (always provided that this has occurred more than twenty-four hours previously). A point of considerable importance that does emerge from our records is that it is not safe to pass an unfavourable verdict on the evidence of one unsatisfactory specimen. It is only after several analyses have confirmed the first gloomy picture that this

can safely be done. For example, we have had 4 samples with counts of below 10 million per c.c., the last coitus in 3 cases being reported as having taken place more than 3 days previously; in 3 of these cases counts of 39 to 115 million were found on other occasions, while in the fourth it has not yet been possible to repeat the count, and all four of these men have fertilised their wives since their unfavourable counts, without receiving any treatment. It is, as a matter of fact, of great interest to divide the reports into two main groups: (a) 127 counts on semen from 93 men who are known to have made their wives pregnant (including in this group hyper-fertile cases), and (b) 165 counts on semen from 125 men whose fertilising capacity has not been proved by a known conception among their wives. It is found that in group (a) the sperm count per c.c. varies within wide limits, the highest count recorded is 575 million sperm per c.c., and, with the exception of the four freak counts mentioned above, the lowest is 21 million. This, it may be noted, is a considerably wider range than is usually stated to be compatible with fertility. Similarly, the counts of immature forms and of sperm with abnormal heads in this group vary within wide limits (3 per cent to 60 per cent). When group (b) is considered, variation is even greater: the numbers of sperm per c.c. ranging from 0 to 500, and the percentages of morphologically abnormal head forms from 7 per cent to 60 per cent; obviously this group includes some fertile men whose wives are at fault, but it also includes all the husbands who are without question mainly, if not entirely, responsible for the infertility of their marriages; i.e. 11 cases with complete azoospermia (5 per cent of all cases examined), and 25 cases with counts found repeatedly to be below 10 million. Histiograms are appended which show the distribution of the density of counts and of the percentages of abnormal head forms in these two groups. Estimation of the total number of active sperm in a specimen and of their viability under various conditions undoubtedly gives much information about a man's fertilising capacity, but a discussion of the findings would occupy too much space. True necrospermia is, in our experience, exceedingly rare. It is of interest to note that fewer than twenty husbands have refused to submit semen for examination.

TABLE 2.

Showing distribution of density of counts (million sperm per c.c.) in the two groups of men discussed above.
Million sperm per c.c.

	0	0-9	10-24	25-49	50-99	100-199	200 and over
a. Fertility proven ..		2.5 %	9 %	17 %	31 %	31.5 %	9 %
b. Fertility not proven ..	8 %	20 %	11 %	10 %	22 %	20 %	9 %

TABLE 3.

Showing distribution of percentages, in differential sperm counts, of abnormal forms (heads and immature) in the same two groups.

	0-9 %	10-19 %	20-29 %	30-39 %	40 % and over
a. Fertility proven	20 %	44 %	25 %	8 %	3 %
b. Fertility not proven ..	8 %	42.5 %	29 %	11 %	9 %

Artificial Insemination.

Has been used for cases where the husband is impotent but possesses fertile semen. The clinic also has a list of semen donors whose identity is guarded with some care, but who are known to the medical officer as having sound heredity and health, and being of proved fertility. This service is seldom called for, as by no means all irremediably sterile husbands are prepared to agree to it. Needless to say, artificial insemination from a donor is never done without the full knowledge and consent of the husband.

Examination of Blood for Rhesus Factor and other blood groups.

A number of couples, where the wife has had repeated miscarriages, have been examined for this factor. Incompatibility between husband and wife has not yet been found in cases of very early miscarriage. But in cases when the foetus dies at the fourth month or later Rhesus incompatibility has been found on several occasions.

Results

Of the 336 women comprising the infertile group here discussed, 109 have conceived on one or more occasions since their first visit. Those pregnancies that have terminated have done so as follows:—

- 64 Live births (3 of these the result of artificial insemination from donors).
- 4 Still births.
- 33 Miscarriages.
- 36 are at present pregnant.

BOOK REVIEWS

THE ESSENTIALS OF MODERN SURGERY

By R. M. HANDFIELD-JONES and A. E. PORRITT, 2nd edition. E. & S. Livingstone, Edinburgh. 1943. Price 40s.

This well-known book, first published in 1938 and since reprinted in 1940, has been revised under considerable difficulties owing to one co-editor being on active service.

There is a tendency in a book of this character to aim at comprehensiveness to an undue degree, and so we find descriptions of such rare conditions as plague, yaws, blasto-mycosis, and madura foot; whereas a few words on scabies and secondary infection, and ringworm of the groins and toes, would be more useful to the average reader. Similarly, there is the usual chapter on anaesthetics, illustrated from instrument catalogues, of little instructive value; those types of anaesthetic likely to be used by the surgeon himself, such as local or spinal anaesthetic, are very briefly referred to.

In the chapter on burns the authors do not appear to have recognised the latest tendencies in treatment. That on shock and resuscitation is good, though the reviewer was disappointed in his hope of learning how a B.L.B. mask works, and how fast one runs oxygen, etc. Alas, he remains as ignorant as before, though he looked it up in each of the three places where reference to this treatment is made. Moreover, the excuse that experience alone teaches, might refer to most of the subjects dealt with.

The chapter on septic hands and that on venereal diseases are both of outstanding merit, and of themselves would warrant the purchase of this book.

The segregation of venereal diseases no doubt has advantages, but one result is that the average medical student knows little about them, and the fact that none of his examiners nowadays has any recent experience of the treatment of these conditions means that they rarely matter in examinations, but to the young surgeon at sea or in distant lands these subjects may be of the greatest importance, and to every young service medical officer this chapter should be of the greatest help with its lucid descriptions and practical recommendations regarding treatment.

As one would expect, a book compiled by fifteen contributors, must contain some contradictory statements—thus, on p. 852 ligation of the angular vein is recommended, whereas on p. 233 occurs the dogmatic statement "Ligation of the angular vein is quite futile." A rather disturbingly intolerant statement by an examiner in surgery.

The book is well produced and easily readable, to a degree unusual in a work of this type. Miss Anna Zinkeisen has contributed some delightful coloured illustrations, the artistic merit of which far outweighs their limited didactic value.

This book provides an amazing amount of information on a very wide range of subjects, and should prove a most useful book to all medical students, as well as an extremely useful book of reference to those whose undergraduate days are being left behind by an ever widening gap; such men should look at the dates of their present books of reference from time to time. It will come as a shock to many to find their most up-to-date work on surgery was produced ten to twenty years ago, though in their minds it "only seems the other day" when they bought it. To such, Handfield-Jones and Porritt have produced the necessary remedy.

FRACTURES AND JOINT INJURIES

By R. WATSON-JONES. 3rd edition. Vol. II. E. & S. Livingstone, Edinburgh, 1943. Price 75s. per set of two volumes.

Volume II is now available, and fulfils the expectations created by Volume I, which appeared some months ago, and of which a review has already appeared.

The production of this book is quite amazing in wartime. The quality of the paper and print, and the new coloured illustrations, as well as the excellent reproduction of X-ray photographs, fills one with admiration. This volume is numbered consecutively with Volume I, and consists of 513 pages devoted to subject matter. It is stated on the book jacket that there are "745 photographs, X-rays and diagrams, many of which are in colour." This will give some idea of the lavish way in which this work is produced. Some feel that a review should be a criticism and